OPERATING INSTRUCTIONS

FOR

TYPE 804 CS 1
U - H - F
SIGNAL
GENERATOR

INCLUDING
SERVICE
MAINTENANCE
NOTES

FEDERAL

FEDERAL MANUFACTURING & ENGINEERING CORPORATION
BROOKLYN
NEW YORK

FME

OPERATING INSTRUCTIONS FOR TYPE 804-CS1 U-H-F SIGNAL GENERATOR

1.0 DESCRIPTION

1.1 PURPOSE

The type 804-CS1 ultra-high frequency Signal Generator is a device for producing radio-frequency oscillations over a frequency band between 7.5 megacycles and 330 megacycles and is so arranged and shielded that a continuously variable calibrated output voltage is obtained throughout the range. It is designed for testing radio receivers and other high frequency electronic devices requiring a source of calibrated voltage.

1.2 FREQUENCY RANGE

The frequency range of 7.5 megacycles to 330 megacycles is arranged to be covered in five steps, any one of which can be chosen by means of a band-change switch on the front of the panel. Within each range the frequency is controlled by a worm driven tuning condenser. The driving shaft carries a 100 division dial. Fifteen turns of this dial are required to cover each frequency range. Geared with this small dial is a large indicator dial which carries on the outside edge a scale with 15 uniform divisions and, in addition, five direct-reading frequency scales corresponding to the five frequency ranges. The band-change switch is located in the center of the indicator dial and covers with a mask all scales that are not used, exposing only the one selected.

In addition to the five frequency ranges, a sixth position of the frequency range switch has been provided for the convenience of the user. A plug-in type of coil without winding is furnished with the instrument.

1.3 OUTPUT

The Output of the Type 804-CSI U-H-F- Signal Generator is continuously variable between 1 microvolt and 20 millivolts. The output is determined by the reading of the output meter on the panel and by the setting of the single calibrated attenuator dial. The output may be obtained either unmodulated or modulated. Modulation is adjustable up to 60%. An internal source for modulation at 1000 cycles is provided. Provision is also made for use of external modulation.

1.4 POWER SUPPLY

The Type 804-CS1 Signal Generator, is intended for use on 115-volt or 230-volt power lines of 42- to 60- cycle frequency. The primary of the power transformer has two windings which can be connected in parallel or in series. The correct voltage for which a particular instrument is wired is indicated on the name plate located below the receptacle for line connection. The power consumption is approximately 25 watts.

2.0 PRINCIPLES OF OPERATION

2.1 DIAGRAMS

A wiring diagram which follows closely the actual arrangement of component parts in the instrument, will be found on the inside of the cabinet. Additional diagrams will be found in this booklet under Figures 1 and 8.

The power supply furnishes filament and plate power for the Type 955 Acorn Oscillator Tube, V4, and the Type 6G6-G Modulator Tube V3. The modulator tube can be used as a generator of 1000-cycle modulating voltage or as an amplifier for external modulating voltages. The output of the oscillator is connected to a capacitive attenuator and is available after attenuation at a jack at the lower right-hand corner of the instrument.

2.2 OPERATING VOLTAGES

The heaters of all tubes operate at 6.3 volts. Plate voltage is obtained in a full-

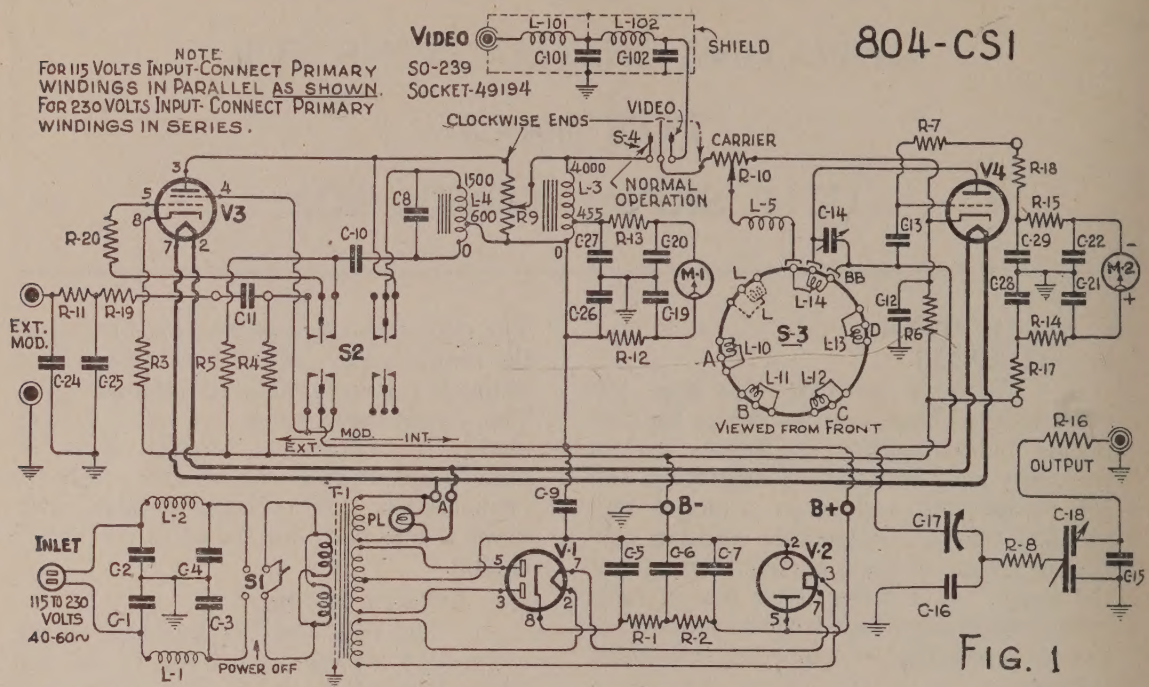

FIG. 1

FIGURE 1. Circuit Diagram of Type 804-CS1 U H F Signal Generator

wave rectifier circuit and is maintained at 150 volts by means of a Type VR-150-30 Stabilizer Tube, V2. A resistance capacitance filter is used to smooth out power supply ripples.

2.3 CARRIER OSCILLATOR

The plate and the grid of the 955-type Oscillator Tube, V4, are permanently connected to rotor and stator, respectively, of the tuning condenser. Rotor and Stator are balanced to ground. The maximum and minimum capacitances of the tuning condenser C-14 are 150 $\mu\mu f$ and 12 $\mu\mu f$. By means of the FREQ. RANGE switch any one of the five tuning coils can be connected across the tuning condenser. The cathode of the oscillator tube is grounded for radio frequencies by a condenser, C-12. The plate voltage is supplied at a tap of each coil. The plate voltage is controlled by the CARRIER potentiometer and is set to give 100 microamperes grid current as read on the right-hand meter on the front panel. The grid current of the oscillator tube is proportional to the amplitude of oscillation and is used to establish the proper level of carrier voltage fed to the attenuator.

2.4 MODULATOR

2.41 NORMAL MODULATION

With the toggle switch S4 set at NORMAL OPERATION the MODULATION Switch S2 controls the operation of the Type 6G6-G Modulation Tube V3. In the OFF position of this switch the screen of the modulator tube is disconnected and the tube is not in operation. In the INT. position, the tube is connected to a circuit which is tuned to 1000 cps $\pm$ 5%, and delivers about 70 volts modulating voltage to the MODULATION potentiometer. Depending on the position of the potentiometer arm, modulating voltage correct for up to 60% modulation is inserted in series with the d-c plate supply of the oscillator tube. Since the d-c supply is regulated at 150 volts, the amount of modulating voltage introduced is directly proportional to the percentage modulation obtained, independent of the actual plate voltage of the oscillator tube which is determined by the position of the CARRIER potentiometer. The percentage modulation is read directly on the left-hand panel meter.

PARTS LIST

RESISTORS

R-1 = 1250 ohms
R-2 = 1250 ohms
R-3 = 500 ohms
R-4 = 500 k ohms
R-5 = 30 k ohms
R-6 = 200 ohms
R-7 = 25 k ohms
R-8 = 30 ohms
R-9 = 20 k ohms
R-10 = 50 k ohms
R-11 = 500 ohms
R-12 = 500 ohms
R-13 = 500 ohms
R-14 = 500 ohms
R-15 = 500 ohms
R-16 = 75 ohms
R-17 = 500 ohms
R-18 = 500 ohms
R-19 = 500 ohms
R-20 = 100 ohms

TUBES

V-1 = R.C.A. Type 6X5-GT
V-2 = R.C.A. Type VR-150-30
V-3 = R.C.A. Type 6G6-G
V-4 = R.C.A. Type 955

INDUCTORS

L-1 = 180-130
L-2 = 180-130
L-3 = 180-305
L-4 = 180-300
L-5 = 180-131
L-10 = 186-8 (240-330 mc)
L-11 = 186-9 (120-240 mc)
L-12 = 186-11 (50-120 mc)
L-13 = 186-12 (22-50 mc)
L-14 = 186-13 (8-22 mc)
L- = 186-36 (Plug-in Coil Form, Extra)
L-101) = 180-132 (10 μh)
L-102) = 180-132 (10 μh)

TRANSFORMER

T-1 = 180-293-1

CONDENSERS

C- 1 = 0.001 μf
C- 2 = 0.001 μf
C- 3 = 0.001 μf
C- 4 = 0.001 μf
C- 5) = 10 μf
C- 6) = 10 μf
C- 7) = 5 μf
C- 8 = 0.015 μf
C- 9 = 0.8 μf
C-10 = 0.1 μf
C-11 = 0.01 μf
C-12 = 400 $\mu\mu f$
C-13 = 50 $\mu\mu f$
C-14 = 12-150 $\mu\mu f$
C-15 = 100 $\mu\mu f$
C-16) = 30 $\mu\mu f$
C-17) = 2 $\mu\mu f$
C-18 = 0-15 & 15-0 $\mu\mu f$
C-19 = 0.001 μf
C-20 = 0.001 μf
C-21 = 0.001 μf
C-22 = 0.001 μf
C-24 = 0.0004 μf
C-25 = 0.0004 μf
C-26 = 0.001 μf
C-27 = 0.001 μf
C-28 = 0.001 μf
C-29 = 0.001 μf
C-101) = 200 $\mu\mu f$
C-102) = 100 $\mu\mu f$

SWITCHES

S-1 = D.P.S.T.
S-2 = 4 P.D.T. - 180-175
S-3 = Coil Switch - Part of 186-0
S-4 = S.P.D.T.

METERS

M-1 = 7.5 Volts A.C. Rectifier - 185-0
M-2 = 200 Microamperes D.C. - 183-0

PL = 6.3 Volts - Mazda No. 44 Clear Bayonet Base

NOTE 1: All items starting with 180- to 187- incl. are Federal part Numbers.

NOTE 2: A more complete part list will be found in Figure 8. Substitute physically and electrically equivalent parts of other manufacturers may be used in place of those specified in Figure 8.

This meter is a copper-oxide-rectifier type meter of the 7.5 volts full scale, which is connected to about one-tenth of the turns of the modulation choke L3. In the EXT. position of the modulation switch the modulator tube acts as an amplifier with the modulation potentiometer as the plate load.

Changing the plate voltage of the oscillator tube will change the oscillator frequency in addition to changing the oscillator amplitude. Such a change in oscillator frequency is known as frequency modulation. The amount of frequency modulation increases with carrier frequency and is inversely proportional to tuning condenser capacitance. Allowance for frequency modulation must be made in tests of selective receivers.

2.42 VIDEO MODULATION

The generator can also be modulated externally with signals having very steep wave fronts. For this type of modulation the toggle switch S4, in the VIDEO position, and the modulating voltage is introduced at the coaxial terminal marked VIDEO on the panel.

and 20 millivolts (1 and 20,000 microvolts). At the low output, the variable attenuator capacitance has the low value of 0.00075 $\mu\mu f$. As a matter of fact, this capacitance can be further decreased but the MILLIVOLTS dial has not been calibrated below 0.001 millivolt. The attenuator is compensated to present a constant capacitance to the oscillator circuit to avoid carrier frequency changes with attenuator setting. The compensation is adjusted with 9 screws which can be seen on the attenuator housing.

2.6 OUTPUT CIRCUIT

Output voltages are obtained at the output jack at the lower right-hand corner of the front panel, across a 100 $\mu\mu f$ condenser, C-15, which is built into the attenuator housing and in series with the 75 ohm resistor R-16 which is located inside the output jack. A concentric shielded output cable 3 feet long with a characteristic impedance of 72 ohms is furnished with the Type 804-CS1 Signal Generator. This cable is fitted with male and female plugs and should be inserted into the output jack.

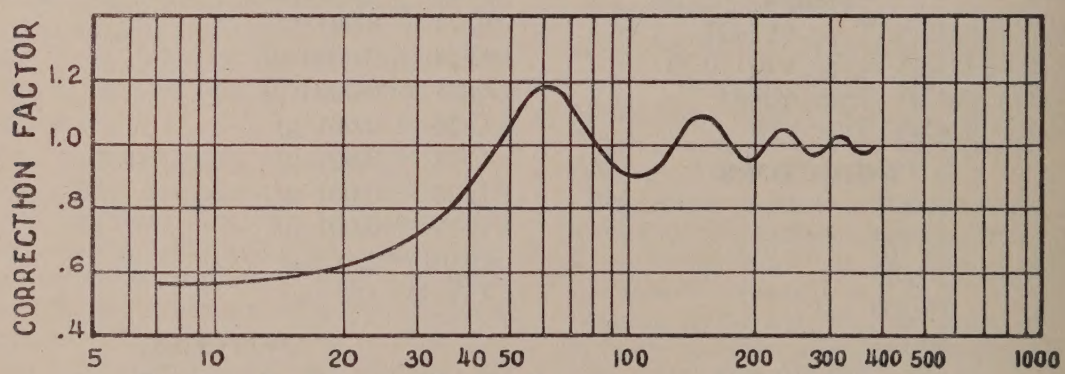

FIGURE 2. Plot of Correction Factor for Output Voltage as a Function of Frequency. Frequency in Mc.

2.5 ATTENUATOR

The oscillator is connected to the attenuator by means of a capacitance voltage divider C-17 and C-16. The actual voltage at the attenuator input is about one-tenth of the grid voltage of the oscillator. The output capacitance of the attenuator is 100 $\mu\mu f$, and the variable attenuator capacitance varies between very small values and 15 $\mu\mu f$. The attenuator dial is calibrated between 0.001

The Type 187-24 Terminal Unit which is furnished in addition, merely serves to convert the concentric output terminal into convenient screw terminals.

The calibration of the attenuator dial is given in terms of open-circuit output voltage at the output jack. For high frequencies the output voltage at the far end of the output cable is practically the same. For lower frequencies a correction has to be applied.

The output impedance approaches 72 ohms at the high-frequency end and corresponds to the 185 $\mu\mu f$ at low frequencies (100 in the output and 85 $\mu\mu f$ in the cables). Correction factor and output impedance plotted against frequency are shown in Figures 2 and 3, respectively. The resistive and reactive components of the output impedance are shown in Figure 4.

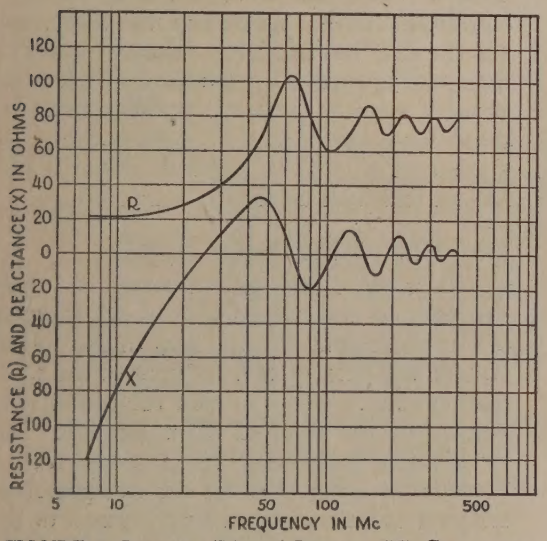

FIGURE 4. Resistive (R) and Reactive (X) Components of Output Impedance.

To obtain low output voltages at constant output impedance, an additional attenuator, the Type 187-35 Insertion Unit, can be connected to the output cable. This unit contains a T pad attenuator of 60, 15 and 61.4 ohms and reduces the output voltage at high frequencies by a factor of 10:1; at low frequencies the attenuation is higher. Figure 5 shows the correction factor plotted against frequency. The output impedance of the insertion unit is practically constant at 75 ohms.

3.0 OPERATING INSTRUCTIONS

3.1 POWER SUPPLY

Before connecting the instrument to the line make sure that line voltage and frequency agree with those shown on the name plate below the power cord receptacle. The power transformer is made with a split primary which can be connected in parallel or in series, (See Diagram, Fig. 8). Whenever a change in connection of the power transformer is made, the name plate below the receptacle should be unscrewed and reversed.

To follow more easily instructions in the next paragraphs, it is suggested that the modulation switch be set to the OFF position and that the MODULATION and CARRIER potentiometers be turned all the way in a counter-clockwise direction b e f o r e throwing the ON-OFF switch to ON.

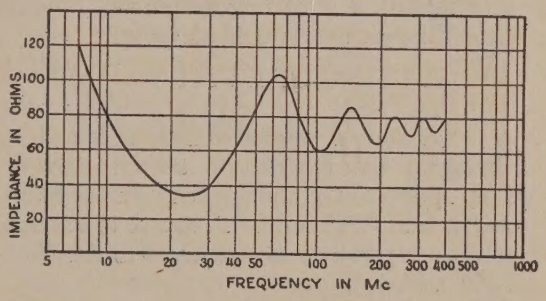

FIGURE 3. Plot of Output Impedance at End of Cable as a Function of Frequency.

3.2 SETTING OF CARRIER FREQUENCY

The carrier frequency is set by the FREQ. RANGE switch and the tuning condenser dial can be adjusted to the desired value on the direct-reading frequency scale which is exposed.

TUBES AND PILOT LIGHTS

Type	Function	Location
955	Carrier Oscillator Tube	Isolantite socket on top of tuning condenser
6G6-G	Modulator Tube	Left-hand side of instrument compartment
6X5-GT	Rectifier Tube	Vertically in Power Supply compartment
VR-150-30	Regulator Tube	Horizontally in power supply compartment
6.3 Volt	Pilot Light	Front Panel

3.3 SETTING OF CARRIER AMPLITUDE

To establish the proper level of carrier amplitude at the attenuator input, the CARRIER potentiometer is set to give 100 microamperes grid current on the right-hand meter. If it is not possible to set to 100 on the two highest frequency ranges, the meter can be set to a convenient lower value, and the output of the signal generator will be correspondingly reduced.

3.4 SETTING OF INTERNAL 1000-CYCLE MODULATION

Internal 1000-cycle modulation is obtained by throwing the modulation switch into the INT. position and the toggle switch at NORMAL OPERATION. The percentage modulation is controlled by the MODULATION potentiometer, and the desired value is set on the left-hand meter. The carrier and modulation controls show a slight interaction. For correct output both meters should be set to the desired values.

3.5 SETTING OF EXTERNAL MODULATION

External modulation is obtained by throwing the modulation switch into the EXT. position and the toggle switch at NORMAL OPERATION. A source of external modulating voltage is connected to the EXT. MOD. binding posts.

The input impedance at the binding posts is 0.25 megohm. The modulation characteristic is flat within ± 2db, between 100 and 20,000 cps, and within 1db between 20 and 10,000 cps. Control and setting of the desired percentage modulation is exactly the same as for internal modulation (See paragraph 3.4). When external modulation is used, do not overload the input circuit. The best procedure is to turn the MODULATION control to maximum, and use the external oscillator volume control to regulate the percentage modulation. It takes about 7 volts to get 50% modulation under these conditions. Twelve volts is the maximum that should be applied to the EXT. MOD. terminals under any condition.

3.6 VIDEO MODULATION

If the carrier potentiometer is left in the position determined by the 3.3 (Setting of Carrier Amplitude) the peak of the output voltage will be correct if the peak of the modulation voltage is +150 volts to ground (the voltage of the internal plate supply). For modulation with very steep wave fronts, however, it is better to set the carrier potentiometer to its maximum position and to determine the peak of the modulation voltage required for correct output. This is done by finding the plate voltage that will give 100 microamperes grid current.

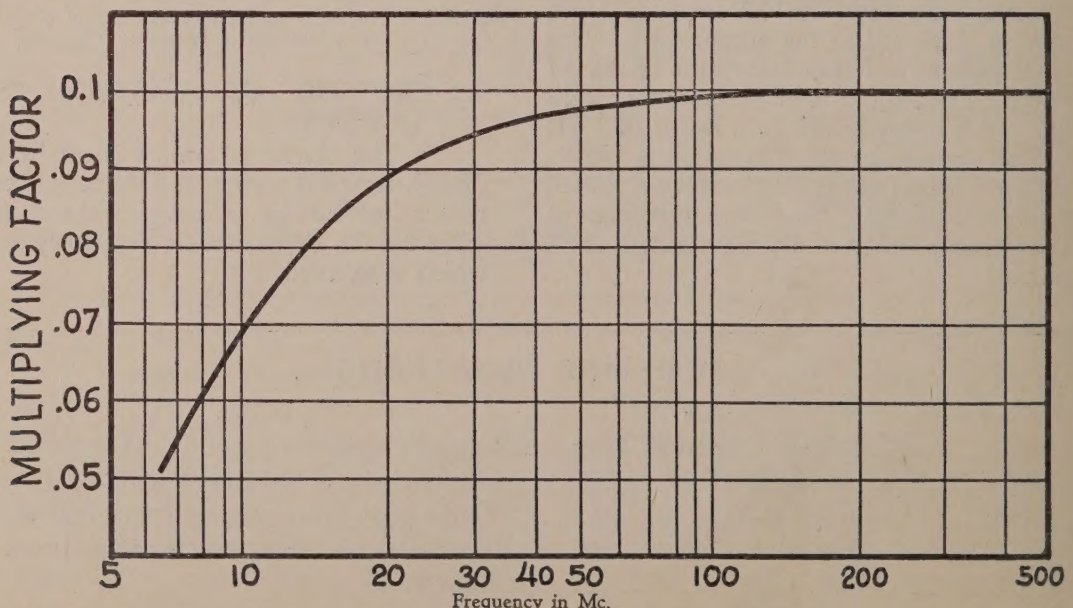

FIGURE 5. Correction Factor for Output Voltage when Type 187-35 Insertion Unit is Connected to end of Cable.

3.7 SETTING OF ATTENUATOR

After establishing the correct level of unmodulated or modulated carrier at the desired frequency, the output voltage can be set to any value between 0.001 and 20 millivolts, as marked on the calibrated attenuator dial. As explained in paragraph 2.6, the output voltage then is correct for the open circuit condition at the output jack and for the open circuit condition at the end of the 3 foot output cable for high frequencies. For low frequencies, particularly below 50 mc, the correction factors shown in Figure 2 have to be used.

3.8 EXTERNAL ATTENUATOR

For low output voltages at constant output impedance the Type 187-35 Insertion Unit is plugged into the output cable. This unit reduces the output voltage by a factor of 10:1 except at low frequencies where the correction factors of Figure 5 must be used.

3.9 TESTING OF SELECTIVE RECEIVERS

As explained in paragraph 2.4, pure amplitude modulation can not be obtained with the Type 804-CS1 U-H-F Signal Generator. In addition to amplitude modulation, frequency modulation will be present, particularly at the high-frequency end of each frequency range. This frequency modulation will be very noticeable in testing selective receivers. It will be observed that the receiver output does not increase with increased percentage modulation and that additional peaks are observed as the receiver is detuned. Testing of selective receivers should therefore be confined to testing with unmodulated carrier.

3.10 PLUG-IN COIL FORM

A plug-in coil form is furnished with the Type 804-CS1 U-H-F Signal Generator. This can be plugged into the low-loss bakelite disc of the range-changing switch in a position corresponding to the blank sector of the indicator dial. No winding is furnished. This position is intended for an additional frequency range. It can be used, for instance, with a fixed shunt capacitance for reduced frequency spread and improved setting accuracy. Owing to the plug-in type construction of the coil, frequencies above 100 mc can not be obtained, but frequencies well below the range of the Type 804-CS1 U-H-F Signal Generator, can be produced.

As an example, a coil with a 3-bank winding of 140 turns No. 30 DCC wire with a tap at 70 turns and with a shunt capacitance of 100 $\mu\mu f$ will have a range of 0.8 mc to 1.2 mc. With a $\frac{3}{8}$" diameter dust core, the range will be 0.6 mc to 0.9 mc.

4.0 SERVICE AND MAINTENANCE NOTES

The only parts of the Type 804-CS1 U-H-F Signal Generator which are subject to wear and deterioration, and which require periodical attention are the vacuum tubes, the tuning condenser contacts, and the band-change switch contacts. In addition, as a result of aging or excessive temperature variation, the calibration of the inductors may show slight drifts.

4.1 MAINTENANCE

These notes are meant to aid the operator in maintaining the instrument in first class condition. Examination may be necessary, especially after long periods of usage.

4.2 BAND CHANGE SWITCH AND CONDENSER CONTACTS

The band-change switch and the condenser contacts may become erratic in operation after long use as a result of dust accumulating on the contacts. When this occurs the contacts should be carefully cleaned with a small cotton swab on the end of a thin stick, saturated with carbon-tetra-chloride or equal.

4.3 ERRATIC VARIATIONS IN OUTPUT

Examine and clean all contacts of the band-change switch, as stated above. Be sure the contact springs make good contact with the switch blades. (See Figure 6).

Remove cover on bottom of main condenser (See Figure 7); and clean the rotor and shaft contacts. DO NOT BEND THESE CONTACTS SO AS TO REDUCE THE PRESSURE, OR THE FREQUENCY CALIBRATION WILL BE ALTERED. BE SURE THESE SPRINGS MAKE GOOD CONTACT.

Check contacts of Type 955 Oscillator Tube (See Figure 6).

Clean carrier rheostat with crocus cloth, then wipe with a dry cloth.

Try a new type 955 Oscillator Tube (See paragraph 7.0).

Check solder joints and solder terminal screws for looseness.

4.4 SUDDEN JUMP IN OUTPUT AS CARRIER CONTROL IS INCREASED

If the CARRIER meter jumps suddenly upwards, this may indicate the generation of high-frequency parasitic oscillations.

Such oscillations may be eliminated by slightly shortening the loop of wire (thin ribbon-like wire) which connects the oscillator tube plate to the anchor terminal (See Figure 6). Do not shorten this more than necessary as this process decreases the output and may alter the frequency calibration at the high frequency end of the two highest frequency ranges.

4.5 CARRIER METER DOES NOT INDICATE

If normal carrier signal appears at the output jack, check the meter. The DC full scale current should be 200 microamperes.

If the meter is defective, it should be replaced.

If, however, no signal appears at the output jack, see paragraphs under 4.3.

Check resistors, R-14, R-15, R-17 and R-18 (500 ohms) and see that CARRIER meter is not open circuited.

Check continuity of Choke L-5 the DC resistance should be about 400 ohms.

Check the voltages on the oscillator tube.

Check condenser C-13 (50 $\mu\mu f$) (See Fig. 6) and see that its leakage resistance is greater than 50 megohms.

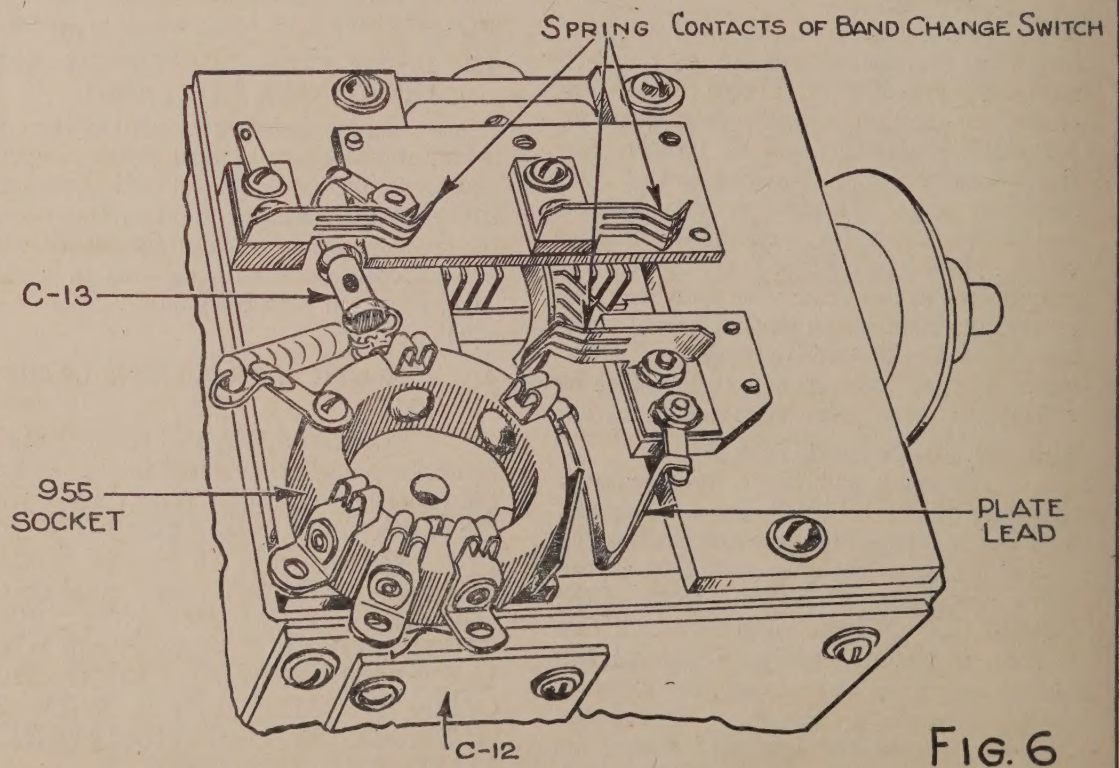

FIG. 6

TOP VIEW OF MAIN TUNING CONDENSER C-14

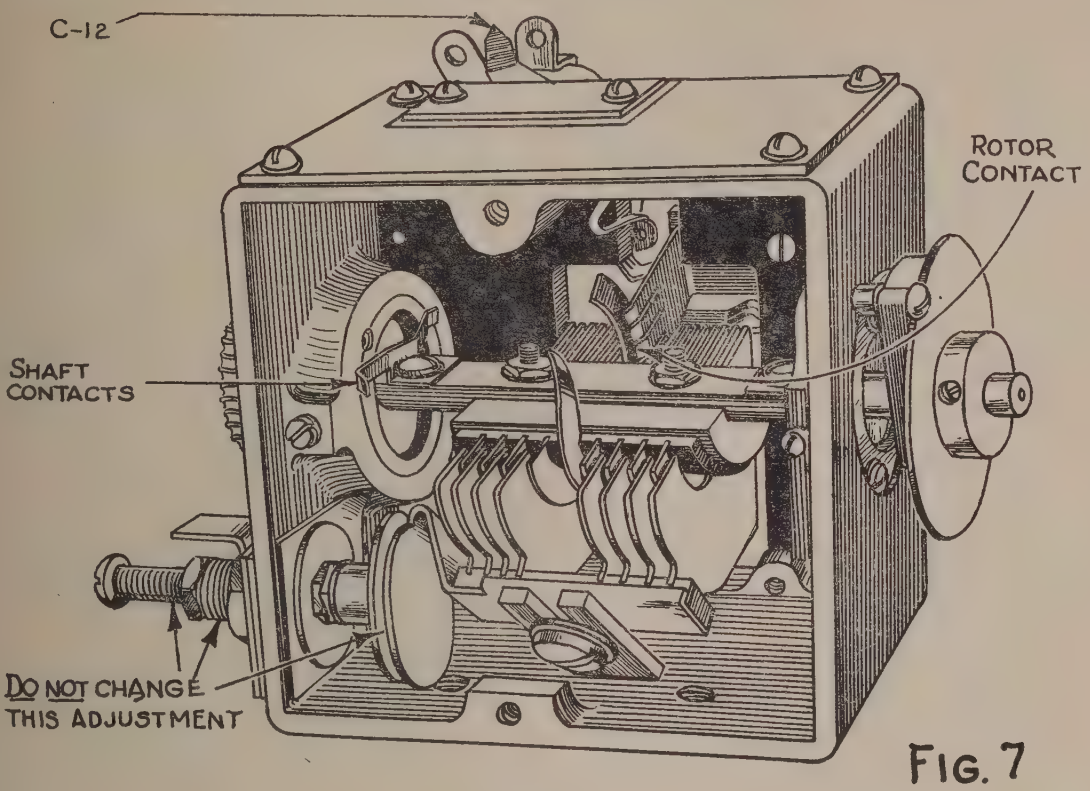

FIG. 7

BOTTOM VIEW OF C-14 MAIN TUNING CONDENSER WITH COVER REMOVED

4.6 MODULATION METER DOES NOT INDICATE

Check both internal and external modulation and see if modulation appears on the carrier signal at the output jack.

If no reading is obtained in either case, check MODULATION potentiometer and check R-12 and R-13 (500 ohms).

Check Choke L-3 for continuity, including tap.

Check tube V3 Type 6G6-G.

Check Modulation Meter. Full scale voltage should be 7.5 volts AC and resistance should be 1000 ohms per volt.

If defective, meter should be replaced.

See that the points of the Modulation Switch are clean and are making good contact.

If EXTERNAL modulation operates, but INTERNAL does not, check L-4 and the connections to C-8 and C-10 (0.1 mfd) and Resistor R-5 (30,000 ohms).

5.0 ATTENUATOR — IMPORTANT

No attempt should be made to adjust the attenuator or the attenuator coupling condenser, as removal of the attenuator cover may destroy its calibration. This also applies to all the other screws on the attenuator.

6.0 LEAKAGE

At ultra-high frequencies the problem of leakage becomes acute. Pronounced leakage fields may be produced by a single loose panel screw or a loose meter shield screw. Examine and tighten them all.

7.0 TUBES

The location of the tubes is given on Page 5; the heaters of all tubes operate on 6.3 volts. Plate voltage and current of the 955-type oscillator tube, V4, depends on the selected frequency and on the setting of the controls. The maximum values of voltage and current are 150 volts and 10 milliamperes. These values are obtained at the low frequency end of Coil A and B. The plate current for most of the other ranges is around 5 milliamperes.

Plate and screen voltage of the Type 6G6-G Modulator Tube, V3, are 150 volts; in the INT. and EXT. positions of the MODULATION switch, plate current is about 8 milliamperes and screen current about 4 milliamperes.

CAUTION:

If V-4 (Type 955 Oscillator) must be replaced, select a replacement which gives good output at the low end of the 120-240 and 240-330 megacycle band. Check also for any change in frequency calibration at 330 megacycles (see also paragraph 4.4).

The V-2 (Type VR-150-30 Voltage Regulator Tube) exhibits a purple glow when in operation. If it does not glow, replace the tube.

Tube V-1 (Type 6X5G Rectifier) and V-3 (Type 6G6-G Audio Oscillator and Amplifier) are not critical and may be replaced without selection.

8.0 POWER SUPPLY

The regulated power supply should deliver 150 volts at about 20 milliamperes to the instrument. The alternating-current ripple voltage as measured across the regulator tube should not be more than 150 millivolts.

These measurements were taken from a stock Type 804-CS1 operating at 90 Megacycles using a Weston Analyzer Model 772, 20,000 ohms per volt.

9.0 FREQUENCY CALIBRATION

Some of the inductors are provided with adjustable dust cores to compensate for slight variations. If adjustments have to be made on any of the ranges it is suggested that the frequency in the middle of the range be set accurately.

In this Model of the 804-CS1 we have not used the standard color code in wiring the unit, but instead, have numbered both ends of each wire with the same number which enables anyone to trace both terminations of an individual wire. Then, by referring to the schematic diagram following, it will enable anyone, even without instruments, to check the wiring, or, if necessary, to make emergency repairs, with the assurance that the proper wire will be replaced at the proper positions.

10.0 WIRING DIAGRAM (Figure No. 8).

The numbers boxed within a square on this diagram are the numbers which will be found on the wire that terminates at the actual units it connects, i.e., assuming, for illustrative purposes, that the diagram shows a wire numbered "6" terminating at a meter marked M-1, you will find that by tracing this wire on the diagram the other end will also contain the same number and then, by seeking this numbered wire on the instrument you can very effectively trace out all connections.

Substitute physically and electrically equivalent parts of other manufacturers may be used in place of those specified in Figure 8.

TYPICAL OPERATING VOLTAGES AND TUBE DATA

Type No.	Heater Voltage	Plate Voltage	Screen Voltage	Plate Current Milliamperes	Screen Current Milliamperes
V-1 6X5G	6.3	290 A.C.	—	—	—
V-2 VR150-30	—	150 D.C.	—	25	—
V-3 6G6-G	6.3	150 D.C.	150	10	5
V-4 955	6.3	150 D.C.	—	2	—

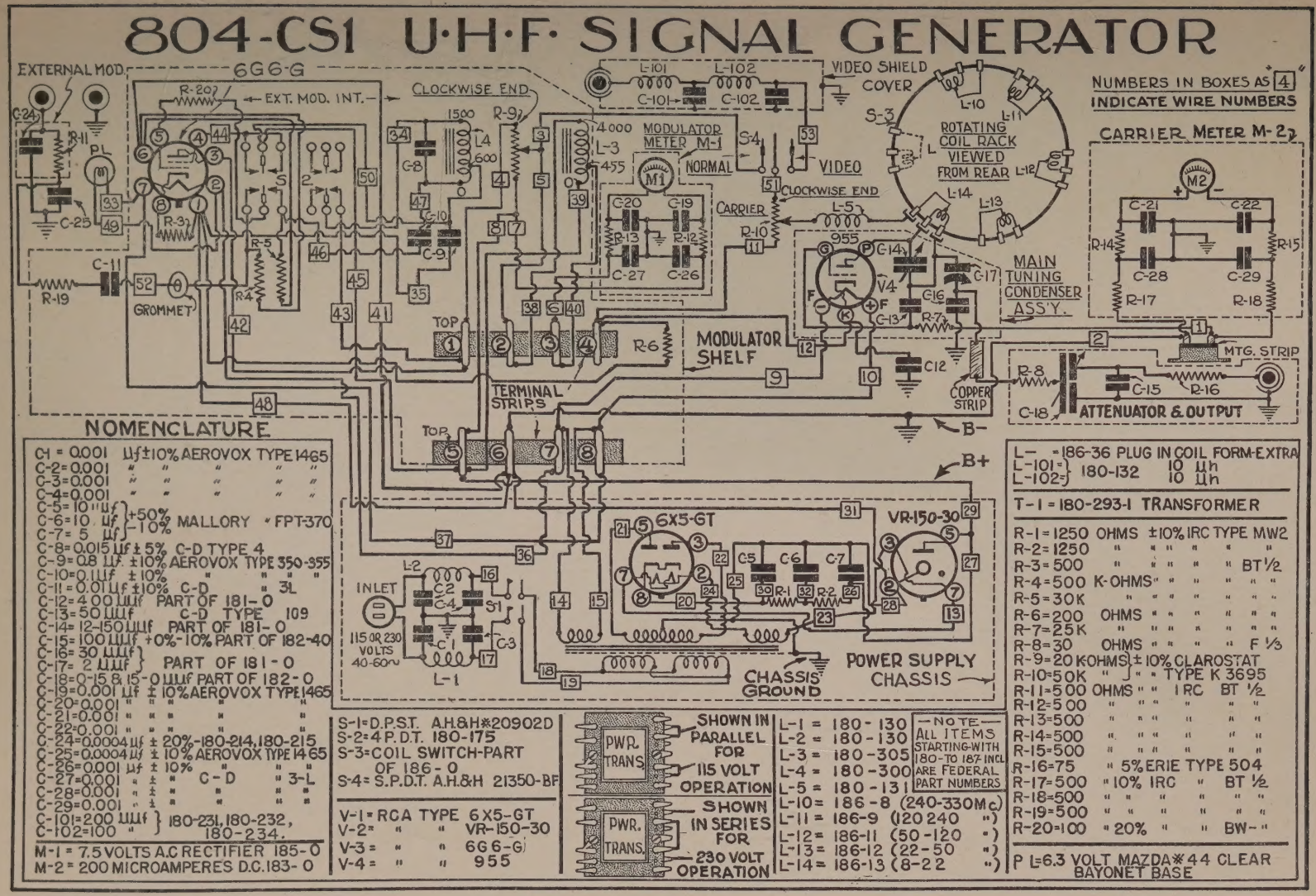
804-CS1 U·H·F· SIGNAL GENERATOR
EXTERNAL MOD.
6G6-G
CLOCKWISE END
EXT. MOD. INT.
VIDEO SHIELD COVER
NUMBERS IN BOXES AS 4 INDICATE WIRE NUMBERS
MODULATOR METER M-1
NORMAL
VIDEO
ROTATING COIL RACK VIEWED FROM REAR
CARRIER METER M-2
CARRIER
MAIN TUNING CONDENSER ASS'Y.
MODULATOR SHELF
TERMINAL STRIPS
MTG. STRIP
ATTENUATOR & OUTPUT
COPPER STRIP
GROMMET
955
6X5-GT
VR-150-30
INLET
115 OR 230 VOLTS 40-60~
CHASSIS GROUND
POWER SUPPLY CHASSIS
B+
B-
NOMENCLATURE
C1 = 0.001 Mf ±10% AEROVOX TYPE 1465
C-2=0.001 " " " " "
C-3=0.001 " " " " "
C-4=0.001 " " " " "
C-5=10 "f } +50%
C-6=10 Mf } -10% MALLORY FPT-370
C-7= 5 Mf
C-8=0.015 Mf ± 5% C-D TYPE 4
C-9=0.8 Mf. ±10% AEROVOX TYPE 350-355
C-10=0.1 Mf ± 10% " " " "
C-11 = 0.01 Mf ±10% C-D " 3L
C-12=4 00 MMf PART OF 181-0
C-13=50 MMf C-D TYPE 109
C-14= 12-150 MMf PART OF 181-0
C-15=100 MMf +0%-10% PART OF 182-40
C-16=30 MMf } PART OF 181-0
C-17= 2 MMf }
C-18=0-15 & 15-0 MMf PART OF 182-0
C-19=0.001 Mf ± 10% AEROVOX TYPE 1465
C-20=0.001 " " " " "
C-21=0.001 " " " " "
C-22=0.001 " " " " "
C-24=0.0004 Mf ± 20%-180-214, 180-215
C-25=0.0004 Mf ± 10% AEROVOX TYPE 1465
C-26=0.001 Mf ± 10% " " " "
C-27=0.001 " ± " C-D " 3-L
C-28=0.001 " ± " " " "
C-29=0.001 " ± " " " "
C-101=200 MMf } 180-231, 180-232,
C-102=100 " 180-234.
M-1 = 7.5 VOLTS A.C RECTIFIER 185-0
M-2 = 200 MICROAMPERES D.C. 183-0
S-1=D.P.S.T. A.H.&H #20902D
S-2=4 P.D.T. 180-175
S-3=COIL SWITCH-PART OF 186-0
S-4= S.P.D.T. A.H.&H 21350-BF
V-1 = RCA TYPE 6X5-GT
V-2= " " VR-150-30
V-3= " " 6G6-G
V-4= " " 955
PWR. TRANS.
SHOWN IN PARALLEL FOR 115 VOLT OPERATION
SHOWN IN SERIES FOR 230 VOLT OPERATION
L-1 = 180-130
L-2 = 180-130
L-3 = 180-305
L-4 = 180-300
L-5 = 180-131
L-10 = 186-8 (240-330 Mc)
L-11 = 186-9 (120 240 ")
L-12 = 186-11 (50-120 ")
L-13 = 186-12 (22-50 ")
L-14 = 186-13 (8-22 ")
NOTE ALL ITEMS STARTING WITH 180-TO 187 INCL ARE FEDERAL PART NUMBERS
L- = 186-36 PLUG IN COIL FORM-EXTRA
L-101 = } 180-132 10 Mh
L-102 = } 10 Mh
T-1 = 180-293-1 TRANSFORMER
R-1=1250 OHMS ±10% IRC TYPE MW2
R-2=1250 " " " " " "
R-3=500 " " " " " BT ½
R-4=500 K-OHMS " " " " "
R-5=30K " " " " " "
R-6=200 OHMS " " " " " "
R-7=25K " " " " " "
R-8=30 OHMS " " " " F ⅓
R-9=20 KOHMS ± 10% CLAROSTAT
R-10=50K " } " " TYPE K 3695
R-11=500 OHMS " " IRC BT ½
R-12=500 " " " " " "
R-13=500 " " " " " "
R-14=500 " " " " " "
R-15=500 " " " " " "
R-16=75 " 5% ERIE TYPE 504
R-17=500 " 10% IRC " BT ½
R-18=500 " " " " " "
R-19=500 " " " " " "
R-20=100 " 20% " " BW- "
P L=6.3 VOLT MAZDA #44 CLEAR BAYONET BASE
FEDERAL MANUFACTURING & ENGINEERING CORPORATION

Figure 8. Substitute physically and electrically equivalent parts of other manufacturers may be used

92130